Institute of Actuaries of India

Subject ST1 – Health and Care Insurance

September 2018 Examination

INDICATIVE SOLUTION

Introduction

The indicative solution has been written by the Examiners with the aim of helping candidates. The solutions given are only indicative. It is realized that there could be other points as valid answers and examiner have given credit for any alternative approach or interpretation which they consider to be reasonable.

Solution 1:

i) Some of possible reasons behind entering the overseas market could be:

1) The profit margin in overseas markets may be higher than the domestic market
2) There may be higher demand for the health insurance products in overseas market due to:
    - Lack of State Health Care Facilities
    - Lack of private insurance players
3) The growth in the domestic market may be limited due to saturation.
4) Higher Income levels of the population in overseas market i.e. affordability of Insurance Premiums
5) Favourable demographics i.e. expected experience may be favourable
6) Lower barriers to the entry i.e. it may be easier to enter the market
7) Easy availability of distribution channel
8) Easy availability of other third parties such as Hospitals, third party provides
9) Easy access to human resources for e.g. Educated and skilled labour
10) Lower New Business and commission expenses
11) Favourable Economic and regulatory environment
12) Economic incentives by the government of overseas country
13) Lower taxation and easy repatriation of profits.
14) Favourable exchange rate with the domestic currency.
15) Reinsurer may have recommended entry to specific markets
16) Need for diversification by Geographical area and markets
17) Potential for niche opportunities overseas, which insurer may take advantage of, for e.g.
    - Contracts where insurer can provide better claims control system than the current local competitors
    - Contracts where insurer has better expertise and knowledge
    - Links with key distributors of the overseas market
18) Company may just be following the competitors who might be entering overseas market. [5]

ii)

a) The approach taken to assess the financial impact:

1) The objective may be to assess the impact of entering into the market on key financials indicators of the company.
2) May be done by comparing the financials with and without an entry into overseas market. Alternatively, it may assess the impact of entry on standalone basis
3) A model office may be developed based on the business plan for the overseas business
4) May start with developing a product portfolio with features which are most likely to meet the demand in the overseas market
5) Would need to make assumptions pertaining to
    a. Project's expected business volume and mix
    b. Demographic assumptions
    c. Expenses
    d. Economic variables.

6) Expected volume may be derived by obtaining the data pertaining to population, demographics, level of demand etc.
7) For the demographic assumptions, the company may use:
    a. Own data from the domestic market - this may be relevant if demographic factors are similar
    b. Own data from other overseas market (if available)
    c. Local Population & Insured life data; published data, standard table, regulatory returns etc.
    d. Reinsurance and consultant data

8) Since it is a new market, the company may need to build on margin for adverse deviation in the assumptions
9) Expense assumptions should allow for all the expected outgoes that the company is likely to incur as well as expected expense inflation
10) Should allow for any arrangement with the third parties in business and benefits of economies of scale
11) Economic assumptions should be based on the economic data pertaining to the overseas market, should allow for the rating of the country.
12) Projection should be made in the medium and long term depending on the business plan
13) Need to allow for the reserving, solvency and tax requirement as per the local regulations
14) The financial impact may then be estimated on parameters such as NPV, IRR payback and discounted payback etc.
15) Should carry a range of sensitivity and scenario analysis to assess the impact of deviation from the expected experience
16) May take help from the reinsurance on business planning and market analysis, or may compare the results with any other similar available studies [7]

b) Some of the other factors that the insurer needs to consider before entering the overseas market are:

1) Barriers to entry into the market; expected time and resources involved in obtaining required approval
2) Political and regulatory environment and level of stability
3) Economic environment for e.g. Income and savings level, expected growth, level of interest rates inflation etc.
4) Demand for health insurance product
5) Demographic factors; age, education level, life expectancy etc.
6) Availability and quality of the state benefits
7) Level of Competition; presence of private insurers
8) Consumer confidence in the private players
9) Level of profitability; profit margins of the existing insurance
10) Availability of local expertise and resources.
11) Availability and cost of reinsurance

12) Availability of other third parties such as hospitals, diagnostics, TPAs etc.
13) Availability of data
14) Availability of IT and administration system
15) Reserving and solvency requirements
16) Financial reporting requirement both in the overseas market and local markets
17) Alternative use of capital; if company may explore other products or niche markets in domestic market itself [6]

iii) Some of the possible risks involved are:

1) **Lack of Market Insight** Since it is a new entrant into the market, it may not have enough insight on:
   - Consumer demand and buying behaviour
   - Financial and economic environment
   - Regulatory and legal framework
   - Demographics
   - Health of the population and incidence of illness

2) **Data Availability:** Credible data may not be available, resulting in difficulty in:
   - Assessing the financial impact of the entry into the market
   - Arriving morbidity assumption pertaining to claims incidence rates
   - Predicting future trends in mortality and morbidity
   - Arriving at other assumptions; Lapse, Expenses etc.

3) **Entry into the Market:**
   - The expense of establishing an independent insurance company may be high and the time involved may also be long.
   - This would result in high expense loading and low volumes
   - Viable partners may not be available for a joint venture
   - Partners when available may have legacy issues for e.g. low brand value etc.

4) **New Business Risk**:
   - New business volumes may be different than expected
   - Higher than expected volume may strain the capital
   - Lower than expected volume would result in expense issues resulting in lower profitability
   - The NB mix (by product or customer profile) resulting in adverse experience

5) **Other factors**: Some of other factors are
   - The company would be exposed to foreign currency risk
   - Risk of competition entering the overseas market and offering lower rates
   - The Government may increase the state benefits following a political promise which might make reduce dependence on private insurers.

- Risk of anti-selection and moral hazard may be higher in a foreign land due to lack of information about the market.
- May have limit on the foreign share in an insurance company, which would make it difficult to operate the company freely.
- Limitation on repatriation of profit to domestic market
- Availability of reinsurance and the rate at which it is applicable
- Limited availability of other third parties in overseas market
- Higher than expected expenses may make it impossible for the company to price a profitable product.
- Political instability might make it difficult to have stable business
- Foreign language would be a constrain in communication
- Availability of human resources may not be adequate
- Higher tax rate and uncertainty around future tax rates
- The regulatory environment may be complex with high cost of adherence with the regulation
- Higher possibility of fraud due to nexus between customers and service providers [8]

[26 Marks]

Solution 2:

i) Some of the commonly included health options with long term insurance plans

1) To purchase additional assurance without providing further evidence of health at the normal premium rates at the date on which option is executed
2) To renew a long-term insurance policy, e.g. CI at the end of its original term without providing additional evidence of health
3) To reinstate mortality cover after an accelerated CI plan has paid out on a specified disease event (buy-back option)

[1.5]

ii) Some of the factors which affect health options

i) The term of the policy with option
ii) The number of times policyholder gets the chance to exercise the option
iii) Conditions attaching to exercising the option
iv) The encouragement given to policyholders to exercise the option
v) The extra cost to the policyholders who exercises the option
vi) Selective withdrawals

[1.5]

iii) Some of the possible reasons behind such experience are:

1. The data used in Option valuation may not be appropriate
    a) Incomplete or erroneous
    b) Obsolete and not reflective of the market
2. The statistical distribution underlying the stochastic model may not be appropriate
3. The correlation between the input variable may not be correctly assessed
4. The number of scenarios used in simulation may be less adequate

5. Volume of date may not be enough to run a stochastic model and arrive at reliable results
6. The insurer may not have enough technical expertise or computing capabilities to correctly run a stochastic model.
7. The results from the stochastic model might not being interpreted correctly
8. Other dynamic factors such as change in regulations, tendency to claim may not be adequately allowed for in the model
9. The experience may be adverse for the entire industry due to the change in the demographic profile of the market.
10. This might be random spur without much change in the health insurance environment
11. Increase in anti-selection i.e. those who are likely to make a claim might be opting for the available options
12. Lack of adequate underwriting at the time of issue of the policy
13. Change in the customer segment from the point when the product was priced
14. Increase tendency to claim for e.g. due to economic conditions
15. Increase in the incidence of certain illnesses resulting in higher claims
16. Increase in fraudulent claims due to lack of control over third parties
17. Lack of claims control administration

[6]

[9 Marks]

Solution 3:

i) Some of the possible ratings factors which could be used are as follows:

1. Gender
2. Age
3. Smoker status
4. Education
5. Geographical area
6. Sales channel
7. Frequency of Premium payment
8. Occupation
9. Benefit level
10. By Group Size (For Group Business)
11. By Industry (For Group Business)

[2]

ii) The ways in which the level of education may impact the morbidity experience could be as follows:

1. The level education is likely to impact the **socio-economic status and leve**l of which in turn would impact the morbidity in following ways:
    a) affordability and access to healthcare
    b) Standard of living i.e. better living conditions
    c) Level of nutrition

2. The level of education is likely to impact **the choice of occupation and profession** which in turn would impact the life style and hence morbidity.
3. In case of Income protection plan, an educated claimant is more likely to **respond to the claim rehabilitation benefits** and has a **greater probability of finding alternative employment** opportunities.
4. Those who are well educated are likely to be aware of prevailing issues that impact their health and would be in a better position to care for their health by **taking preventive actions in time**, for e.g. by wearing masks when the air quality is poor.
5. Education might also increase the awareness of individuals regarding the **harmful effects of excessive consumption** of alcohol, tobacco and substance abuse.
6. Level of education would impact the understanding of technology, which may increase **the ability to use and interpret technology based health monitoring system** such as wearable devices etc.
7. Level of education is likely to increase the **awareness about complimentary benefits** usually offered under health insurance plans, for e.g. Gym membership and preventive healthcare packages. Due to greater awareness of the benefits they are entitled to, an educated person is more likely to avail these benefits which in turn would have a positive impact on their health.
8. Similarly, well educated people are likely to have a **higher propensity to claim**. They are more likely to make a claim due to clear understanding of product features. Additionally, education may also impact the ability to make a fraudulent claim. For e.g. well educated insured lives might be able fabricate the required documents more effectively.
9. In addition to morbidity, above factors are also likely to improve the **mortality,** which in case of Income Protection plan, may increase the period for which claim benefit is paid.
10. Since education is likely to enhance individual's **awareness of his/her own health**, there may be a higher risk of anti-selection in educated lives. [5]

iii) Risks involved in not introducing education as rating factor:

1. If the conclusions of the report are correct, and level of education has material impact on the morbidity level, then leaving it out in Pricing would result in inadequate risk categorisation which might result in financial loss in future.

2. There is a risk of anti-selection as well because customers who are not likely to get any favourable rates elsewhere are likely to come to the company. This might result in "Life Co" attracting higher risk lives resulting in higher claims outgo.

3. Since most of the competitors would have revised the premium rates based on education as its rating factor, "Life Co' premium rates are likely to be higher than competitors for class of people who are highly educated. This is likely to result in the loss of New Business volume.

4. Similarly, existing customers might also be tempted to Lapse their policy with "Life Co" and buy a policy with other insurers at a lower rate. Additionally, such a lapsation shall be selective with company retaining high risk policyholders.

5. **5.** The channel partners might also resent such a move as this would mean that the company is not offering the best rates for the policyholders. This is more likely to be from intermediaries who bring in highly educated lives.
6. **6.** This reduction in the number of policies by way of lower new business and lapsation might also limit the benefits of the economies of scale for e.g. the per policy expense loadings are likely to go up.
7. **7.** There might be a reputation risk as well as the company will be perceived as not providing the best value for money, which may further impact the business adversely. Additionally, policyholders of “Life Co” may feel cheated as they have not been treated fairly.
8. **8.** The reinsurer might want the company to use education as a rating factor in the light of the findings of the report. Since the company is not doing so, it might become difficult for the insurer to get competitive reinsurance rates for new business.
9. **9.** If education is not one of the rating factors, then the company might not record education related data in a detailed manner, & hence it may lose out on valuable insight on trends on morbidity by level of education, limiting its ability to introduce such a product in future. [4]

iv) Ways to mitigate the risks involved:

1. Identify the rating factor that the company already uses & which closely approximates education (for e.g. Occupation, Income Level, Location of residence etc.)
2. Monitoring the claims experience regularly and re-price the products if required.
3. Add to the product offerings and feature to make the product easily differentiable and competitive in the market, this would help the company to counter the risk of lapsation. For e.g. widening the range of illnesses covered cashless service etc.
4. Offer No claim discount to improve the quality of policyholders and claims experience and to increase customer retention.
5. Increase marketing and brand awareness activities to create greater brand awareness amongst customer base. Same as point iii above.
6. Introduce specialised products with competitive commission rates for distribution channel partners, especially for channels with high mix towards well educated customers. Alternatively, look for other distribution sources for e.g. online channel which may be more effective in selling such products.
7. Assess the correlation between past claims and education level on own data. This would help the company to assess the realistic impact of education on morbidity amongst its own customer base.
8. Increase the reinsurance cover for select products if required, for e.g. facultative cover for high risks. Additionally, if required take reinsurers assistance in impact and feasibility analysis and technical assistance in pricing, underwriting, claims etc.
9. Strengthen the underwriting process to reduce the risk of anti-selection and fraudulent claims
10. Increase the premiums to reflect the additional risk undertaken due to selective lapsation and anti-selection. Alternatively, reduce the premium rates in order to prevent loss of new business

11. Increase margin for adverse deviation in reserves to allow for the additional risk

[4]

[15 Marks]

Solution 4:

i) Benefits typically available on a PMI plan include:

1) Hospital costs
2) In patient costs such as accommodation/private room, nursing care, operating theatre, diagnostic procedures, surgical dressings, drugs
3) In-patient physiotherapy
4) Day patient costs
5) Accommodation/private room for parent accompanying a child
6) Specialist fees
7) Surgeons' and anaesthetists' fees for in-patient or day-care
8) Physicians' fees for in-patient treatment
9) Outpatient fees/costs such as specialist consultations, diagnostic tests
10) (radiology, pathology), physiotherapy
11) Radio/chemotherapy/scans
12) Additional benefits such as private ambulance, recuperative care
13) Cash for treatment in government system
14) Private Ambulance
15) Recuperative care
16) Benefits may be offered on an indemnity basis
17) There may be limits to payments
18) There may be policy excess applicable
19) Applies only to acute conditions
20) General exclusions are applicable like drug abuse, normal pregnancy etc [5]

ii) Major risks applicable are as below:

1. Income Protection
    1. The main risk relates to sickness transfer probabilities in the underlying multiple state model - claim inception and claim termination rates.
    2. Anti-selection risk – Risk of bad lives opting for the insurers' products especially if lesser underwriting or lower premiums as compared to competition
    3. Withdrawal risk – Selective withdrawal by good lives
    4. Financial risk on withdrawal if withdrawal happens when asset share is negative
    5. Expense risk – Higher than priced expenses
2. Critical Illness
    1. The main risk relates to the rates of diagnosis of the critical illness specified in the contract.
    2. Reputation risk – on account of dispute for conditions and illnesses covered under policy terms and conditions

   iii. Anti-selection risk – Risk of bad lives opting for the insurers' products especially if lesser underwriting or lower premiums as compared to competition
   iv. Financial risk on withdrawal if withdrawal happens when asset share is negative
   v. Expense risk – Higher than priced expenses
3. PMI
   i. Risk related to benefit amounts since PMI works on indemnity basis and benefit amount might be higher than expected on account of medical inflation, increase in fees and cost of treatment
   ii. Risk related to higher than expected claim frequency
   iii. Risk of single large claim or single incident leading to accumulation of claims
   iv. Risk of lower than expected new business volume especially if government offers free or subsidised benefits
   v. Expense risk – Higher than priced expenses
4. LTCI
   i. Risk relates to transfer probabilities in the underlying multiple state model - claim inception probabilities and transfer probabilities between claim states
   ii. Investment risk since benefits are in future and reserve money might earn lower than expected return
   iii. Withdrawal risk selectively by good lives
   iv. Expense risk – Higher than priced expenses
   v. Marketing risk since policyholders expectations may not be met on account of mis-selling

[10]

iii) Risks of suggestions:

1. Risk of customer needs not being met due to lack of understanding of new definitions at the time of buying the product. Even if some additional conditions are added or conditions made comprehensive, customer might not be able to claim due to lack of knowledge of conditions covered.
2. Increased mis-selling risk – Since the conditions will not be standardised and not in line with the market distributor might encourage the customer to buy the product on false grounds and later this might lead to disputes and reputation issues.
3. Date availability for pricing – Date might not be available to price the new conditions leading to incorrect pricing
4. Lower than expected new business volume as customers might not like the change in conditions and might not see the product as good value. It would be more difficult sale as standard conditions sold in the market are not being used
5. Higher than priced expenses to train the sales force with respect to new conditions might need to be incurred

Mitigations

1. Change in policy conditions must be made clear in the policy literature and during sales process

2. Highlight the changes from current condition in policy literature and devise policy for strict penal action against agents and sales persons indulging in mis-selling practices
3. Due to lack of data, reinsurer's help can be taken for pricing. Also, premiums can be made reviewable
4. Conduct market research to understand the customer needs and make changes in conditions accordingly to avoid risk of lower new business volume
5. Training cost should be appropriately estimated in advance by having mock training sessions for the purpose of pricing expenses appropriately

[5]

[20 Marks]

Solution 5:

i) Purpose of analysis of new business sales against targets:

1. To check the strains caused by the volume of new business sold against the capital set aside for this purpose.
2. To check the mix of business in each of the significant homogeneous cohorts against the mix assumed in the pricing basis
3. To check the staffing levels in terms of numbers and competence against those required by the business written
4. To check commissions paid against assumed

[2]

ii)

a) Overall considerations before inclusion of this test in underwriting and impact on underwriting-

Overall-

18. Verify the information available in respect of the test - accuracy
19. Determine the likely time by which the test will be introduced in market
20. Ascertain the cost of test and its availability across the country
21. Consider the impact on existing reinsurance arrangements

[2]

b) Impact on underwriting

1. Need to consider if it would be allowed by Government to conduct this test for the purpose of insurance
2. Would customer be ready to conduct this new test which in turn depends on ease and pain of conducting the test – in centre or at home, simple urine or blood
3. Is cost of test in line with perceived benefits
4. Impact of underwriting decision like rejection of business or higher premium as a result of this test especially if not used by the competition

[2]

c) Impact on each type of business

A. PMI

1. To consider if heart diseases detected by the test acute or chronic in nature as chronic diseases are not covered in PMI product

2. To consider if this heart disease is already covered or should be included as separate benefit. Also, what is the impact of this heart disease on other related disease if any which might lead to multiple claims in single year
3. Impact of including the cost of the test on premium and competitiveness
4. Will a positive result trigger a treatment cost or costs for preventive measures on immediate basis. If yes then impact on PMI claim might be significant. If no, then impact on PMI might not be significant since PMI is short term business

B. IP

1. Consider policy wording to understand if this heart disease is covered in policy terms and conditions or not
2. Would positive result lead to an immediate claim and for how long
3. Would positive result impact the working capability of an individual. If yes, IP policy might be terminated since it is generally bought for income replacement during working life.
4. Like age of being diagnosed with this disease should be considered since IP is mostly sold to younger working population and policy term also ends before retirement. If like age is more the retirement age then IP might not be impacted

C. CI

1. Consider policy wording to understand if treatment of this heart disease is covered in policy terms and conditions or not
2. Consider the stage at which the policy pays out for this heart disease. Would it lead to immediate payment?
3. Is any cost of preventive care covered in the policy.
4. Consider average term of current CI portfolio to determine if actual onset of the disease would fall in policy term.

[6]

iii)

1. Monitor the accuracy level of the test and reliability to understand the extent to which it can be used in underwriting
2. Cost of the test
3. Availability of the test and ease of conduction
4. Reaction of competitors. Are they including the test in their product underwriting?
5. Level of awareness about the test in the market and willingness of the customer to go for the same
6. Regulatory changes in response to this new test
7. Preventive treatments emerging in the market in response to this test

[3]

[15 Marks]

Solution 6:

i) Factors affecting retention limit are as below:

1. The current retention levels for CI portfolio and the need for changing them based on **average claim amount for the existing business and expected new business**

2. **the size of the company's free assets:** the lower the free assets, the lower the reinsurance retention will be
3. **the cost of capital**: the higher the cost (of using capital to reduce claim fluctuations), the lower the retention will be
4. **the level and quality of underwriting:** the more strict the underwriting, the more certain future experience should be, and the higher the retention can be
5. **the mix of business,** especially the different benefit sizes for CI portfolio: the more volatile the business, the lower the retention will be.
6. If the reinsurance is being used to reduce new business strain, the retention level will depend on the **design of the product and the expected new business volumes and mix**
7. Retention level would be set so as to maximise profits on CI portfolio
8. The level of **available in-house expertise**
9. **Cost and type of reinsurance available** would also determine retention level
10. **Company's acceptable level of volatility and risk appetite** for this portfolio would also determine retention level
11. Any **regulatory restrictions** on reinsurance cessions
12. **Tax benefits** on reinsurance cessions
13. **Level of guarantees** offered by reinsurers in premium rates
14. **availability of alternatives** to reinsurance in market

[5]

ii) Clauses of reinsurance treaty:

1. Scope: dates of commencement and (if appropriate) termination of arrangement
2. Type of treaty: original terms or risk premium, quota share or surplus
3. Scope: names of contracts to be included
4. Scope: territories of sale to be covered
5. Scope: maximum and minimum ages at entry/expiry to apply
6. Scope: maximum and minimum amounts of premium/sums insured to be covered
7. Scope: total maximum capacity
8. Scope: underwriting – limits on degree of policyholder impairment or occupational class to apply for automatic treaty inclusion
9. Underwriting authority: limits on premium size, benefit size which can be accepted without reference to reinsurer
10. Details of retentions and methods of calculation of sum reinsured and reinsurance commission
11. Rules for indexation of limits and other amounts
12. Administration requirements: frequency of accounts submission, detail of information, methods of submission, transmission of payments
13. Details of profit calculation (if appropriate) and method of sharing
14. Requirement of reinsurer inspection of insurer files
15. Alternative for facultative treatment of cases outside treaty scope
16. Service agreement (can be two-way) including response times
17. Arbitration agreement (in the event of dispute)
18. Legal jurisdiction of treaty
19. Procedure for changes to treaty terms (e.g. terminations)
20. Reviewable/guaranteed premiums

21. Appendices with schedules of premium rates (office or risk premium)
22. Signatures of persons capable of committing both parties
23. Availability and conditions of use of reinsurer software
24. Details of any financing reinsurance
25. Claims management and acceptance procedures

[5]

iii) Determination of retention limit:

1. Risk is taken care of using one or both the below approaches
   i. Risk fluctuation reserve earmarked for CI portfolio
   ii. Reinsurance for CI portfolio
2. The balance between the two is determined using stochastic approach
3. Estimate the statistical distribution of the claim experience costs of the CI portfolio
4. Project forward expected claims together with the company's assets and liabilities
5. Consider the total of
   (a) The cost of financing a risk experience fluctuation reserve, and
   (b) The cost of reinsurance
6. As the retention limit increases, (a) will increase and (b) will decrease
7. For a given level of risk fluctuation reserve, using simulation a retention level can be determined such that the company stays solvent for 995, say, out of 1,000 runs or a retention can be adopted which minimises the total (a) + (b). This criteria shall be decided based on acceptable risk for CI portfolio. If company is willing to take higher risk in this portfolio, criteria shall be lenient and vice versa.
8. Depending on volumes of expected business from different products, the exercise may be carried out for the whole portfolio, groups of products or for each product separately within the CI portfolio.

[5]

[15 Marks]

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